January 8, 2010

Mr. Gary Collord
Air Pollution Specialist, Energy Section
California Air Resources Board
1001 - I Street
Sacramento, CA
USA 95812-2828

RE: Comments on *Technical Feasibility and Environmental Analysis*
California Air Resources Board (ARB) – Draft for Public Comment

Dear Mr. Collord:

Thank you for the opportunity to comment on the preliminary draft of the concepts developed for California's Renewable Electricity Standard (RES). Similar to California, British Columbia has also taken a leadership role in combating climate change by introducing a carbon tax, legislating greenhouse gas reductions, adopting a low carbon fuel standard and supporting the development of a clean energy sector. IPPBC applauds California's 33% renewable electricity target from eligible renewable energy resources to be achieved by December 31, 2020.

Our purpose in writing is to ask ARB to consider for eligibility, under its definition of "renewable", high head non-storage run-of-river hydro located within the Western Energy Coordinating Council WECC member zone. These projects have minimal environmental impacts compared to other types of generation, and are developed under a rigourous environmental review and regulatory process.

The Independent Power Producers Association of BC (IPPBC), a 19 year old non-profit organization registered in British Columbia, supports its 320 members to produce clean renewable electricity for the British Columbia energy grid which also supplies power to US markets including California. While independent of government, public utilities and other organizations, IPPBC collaborates with provincial and federal government agencies, First Nations, local governments, BC Hydro, BC Transmission Corporation, Powerex, environmental organizations and others in developing a clean economy. IPPBC represents clean and renewable electricity producers who help British Columbia meet its domestic needs, and also has significant potential to meet the needs of members of the (WECC), including California.

IPPBC would like to see the ARB adopt a RES that embodies a principle that expands eligible sources of renewable electricity. All cost-effective, environmentally responsible, and GHG reducing renewable fuel type generation located within the WECC member zone should be included as eligible renewable resources. Specficially, the current eligible renewable resources definition should also be amended to include high head non-storage run-of-river hydro electric facilities larger than 30 MW capacity. Furthermore IPPBC asks ARB to undertake its own review and assessment of high head non-storage run-of-river hydro projects.

Specific Comments and Feedback - RES Eligible Resources:

1. Eligible Resources
2. Excluded Technologies
3. Geographic Eligibility

1. Eligible Resources

Presently California's Renewable Portfolio Standard (RPS) and Assembly Bill No. 64 restrict "eligible renewable energy resource" to hydro projects of less than 30MWs. IPPBC believes this restriction is needlessly limiting and if retained in the proposed RES will prevent California from accessing clean electricity produced in the WECC area including BC. IPPBC requests the ARB and other California agencies to undertake their own due diligence as well as review reports provided by electricity utilities in California that speak to the clean and environmentally benign sources of energy in British Columbia. IPPBC suggests that science should guide a review of existing high-head, non-storage BC projects and their impacts as well as the environmental review process for their approvals. IPPBC would be pleased to assist with providing information and site tours of operating facilities to discuss the environmentally benign nature of these projects.

IPPBC notes that in the past, large hydro projects were constructed on the Peace and Columbia Rivers, as well as other areas. While providing substantial benefits in terms of flood control, these facilities have also served the electrical needs of ratepayers well in BC and elsewhere and offer tremendous power shaping capabilities for renewable energy for the future.

High head non-storage run-of-river hydro is not based on water reservoirs using large dams. These run–of-river hydro projects are much smaller in scale and rely on the high head (elevation drop) available especially in many BC river systems. Typically, these projects have the following characteristics:

- Rather than a large dam, there is a small weir that diverts water into the penstock, with minimal impoundment (less than 48hours of operation);
- Water flows down the penstock to the powerhouse, with the elevation difference between the weir and the intake driving the turbines;
- Some flow passes over the weir, as required by the Water Licence, to maintain the ecological function in the stream immediately below the weir;
- All water is returned to the stream after generation, as required by the Water Licence.

Projects that affect the habitat of salmon or other sensitive species are required to incorporate fish habitat mitigation programs, such that the net impacts (especially for a species like salmon) have been beneficial. In addition, many of the project sites and streams were affected by past forestry practices – collapsed culverts, slumped roads and landslides - and many of these problems were mitigated as part of the construction of the run-of-river project. The configuration of these projects leads to a inherently low carbon footprint that is enhanced by the opportunities for mitigation. (See: Appendix 1: Carbon footprints of different types of electricity generation technologies).

Non-storage run-of-river hydro – covering the range from 1MW systems to those in excess of 50 MWs, have been up and running in BC for over 15 years. After the construction phase, the environmental impact and footprint of typical run-of-river projects in BC is extremely modest. (See: Appendix 2: Comparison of environmental impacts by fuel/technology). Furthermore, the lifecycle payback ratio for run-of-river hydro is extremely positive (See: Appendix 3). Further, wherever possible, existing forestry roads andrights-of-ways for other utilities are utilized for

penstock routes and transmission lines. Where multiple projects exist in an area, there are efforts to plan and build a single transmission line to reduce the overall footprint of the projects.

IPPBC is confident that if the ARB has the benefit of reviewing BC's high head non-storage run-of-river hydro projects and the environmental assessment process, the non-storage, and benign nature of these projects and the rigour of the process will be evident. Further, the abundance of opportunities in BC for these small hydro projects is such that only the most cost effective resources will be developed, as determined through competitive Calls for clean power from BC Hydro.

2. Excluded Technologies

As proposed, the RES regulation will not extend eligibility to large reservoir based hydroelectric generating facilities. However, BC's installed large dam hydroelectric facilities, and most importantly, the huge reservoirs created behind the dams, all of which are over 20 years old, represent significant opportunity as "storage capacity" to help shape and firm new clean and renewable energy generation.

This shaping of power by marrying existing large scale hydro (storage reservoirs) with new clean energy (wind, solar and small scale high head hydro), produces a very cost efficient and competitively priced firm electricity product for domestic and export needs.
IPPBC recommends that the proposed RES accommodate the use of existing large hydroelectricity as eligible for firming and shaping capacity for the clean energy sector in BC, including energy for export.

3. Geographic Eligibility

IPPBC supports the proposed RES eligibility for facilities in or out of state connected to the Western Electricity Coordinating Council (WECC) transmission system.

On March 24 2009, the Honourable Barry Penner, BC Minister of Environment wrote a letter to state legislators in California to address inaccurate information about environmental and regulatory standards and processes in British Columbia circulated by critics of the clean energy sector in the province. The typical high head non-storage run-of-river hydro projects in BC are required to obtain about 50 permits and approvals. The standard of environmental scrutiny and regulation is rigorous, with numerous scientific assessments carried out to study project sites prior to government approval for construction. In addition to, and as part of the regulatory processes on all resource development and land use matters, there is a requirement for dialogue involving IPP companies and local communities, First Nations, and the general public. IPPBC is also looking to improve the regulatory process by assisting governments, and engaging First Nations, key stakeholders, and others.

The generation of power by high head non-storage run-of-river projects in British Columbia has been verified and qualifies for participation in the EcoLogo program, regardless of the size of the project. The EcoLogo program, founded by the Canadian government in 1988 (meets ISO 14024 standards for eco-labelling) is an international organization for standardization of eco-labeling. The EcoLogo program compares products with others in the same category, develops specific and scientific criteria that consider the life-cycle of a product and awards the EcoLogo certification to those products that are verified by a third party as complying with the criteria. IPPBC suggests that Eco-Logo Certification (or a similar process) can provide the ARB with confidence that clean

energy projects, including high head non-storage run-of-river power generation in British Columbia, represent clean, renewable sources of energy and are suitable for California's RES as clean-energy projects.

Conclusion

IPPBC is concerned that as work proceeds on developing the RES, that it not be restricted by the existing RPS eligibility of hydro projects of not more than 30 MW. Limiting the size of hydro projects to 30MW or less will adversely impact a significant number of high head non-storage run-of-river projects in the WECC area, by precluding them from qualifying as an "eligible renewable energy resource". Such a limitation will adversely impact California because it will reduce the available supply of clean, cost competitive and renewable hydro sources of energy that might otherwise be available to supply the California market. Such limitation will also adversely impact the ability of electric utilities to meet their obligations to secure clean and renewable energy supplies as part of their renewable portfolios. Furthermore, this limitation appears to be inconsistent with the requirements set out in Governor Schwarzenegger's letter of increasing the supply pool of renewable projects; expanding the eligibility of projects within the WECC to include more out-of-state projects; and expanding the statutory definitions of renewable that are included in meeting the RPS to include larger hydropower projects.

IPPBC believes that ARB should consider modifying the definition of renewable energy to include high head non-storage run of river hydro projects from British Columbia based on objective scientific assessment of environmental footprint, rather than arbitrary thresholds or definitions. All generating projects in British Columbia undergo a rigorous environmental review and assessment process. IPPBC will be pleased to provide project examples and other information.

IPPBC encourages the ARB to consider the substantial potential and benefits of British Columbia's resources to provide abundant clean, green and renewable energy projects and power to serve both our domestic and export customers. IPPBC is confident that the clean and renewable energy available from British Columbia will help California and other members of the WECC achieve their renewable portfolio standards and their greenhouse emissions reduction targets, as well as satisfying Governor Schwarzenegger's requirements regarding the contents of any state legislation reaching him for approval. Enclosed are several fact sheets and copy of a DVD entitled *Generating Green Power and Jobs in B.C.* that IPPBC recently produced regarding IPP development in British Columbia.

We welcome the opportunity to meet and discuss these matters with you and would be happy to provide you with any additional information you may require. We can be reached at 604-568-4778.

Yours sincerely,

Original signed by Paul Kariya

Paul Kariya, PhD
Executive Director

Cc: Ms. Mary Nichols, Chair
Mr. James Goldstene
Mr. David Mehl
Mr. Mike Tollstrup

The Honourable Sam Blakeslee
The Honourable Felipe Fuentes
The Honourable Danny Gilmore
The Honourable Nancy Skinner

List of Appendices

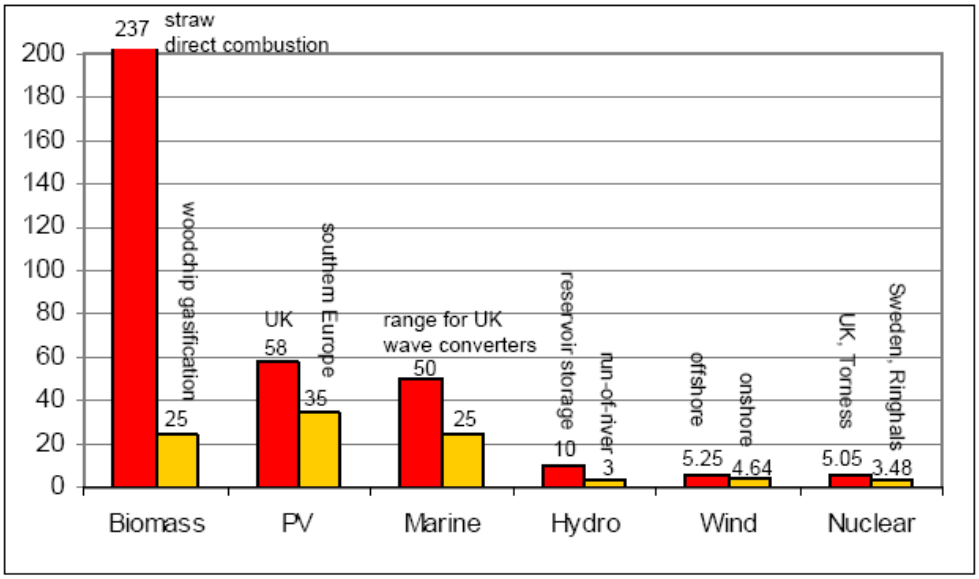
1. Carbon Footprints of Different Electricity Generation Technologies
2. Comparison of Scored Environmental Impacts by Fuel/Technology
3. Comparison – Power Plant Life Cycle Payback Ratio

Appendix 1

Carbon Footprints of Different Electricity Generation Technologies

In October 2006 the UK Parliamentary Office of Science and Technology Energy and Environment Report evaluated the "Carbon Footprint of Electricity Generation" and produced the following table:

Carbon footprint of low carbon electricity generation technologies
(UK & Europe)



An accompanying slide on Hydro states:
Carbon footprint range:

Highest: 10 gCO_{2eq}/kWh (non-alpine reservoir storage)
Lowest: 3 gCO_{2eq}/kWh (non-alpine run-of-river)

Issues:

- Two main schemes: reservoir storage (large scale), run-of-river (small scale)
- Storage schemes have higher carbon footprint since a dam is constructed
- Run-of-river schemes have the smallest carbon footprint of all technologies
- Hydro has small CO_2 emissions, but some methane (CH_4) is also emitted

* I think that alpine run of river will be lower since high head means smaller headpond.
** Note the use of the label "reservoir storage".

The report states:

- All electricity generation technologies generate carbon dioxide (CO2) and other greenhouse gas emissions. To compare the impacts of these different technologies accurately, the total CO2 amounts emitted throughout a system's life must be calculated.

- "Run of river schemes have very small reservoirs (those) with weirs) or none at all so do not give rise to significant emissions during their operation. Carbon footprints for this type of hydro

scheme are some of the lowest of all electricity generation technologies (<5gCO2eq/kWh)."

- "Hydroelectric storage schemes require dams. In run-of-river schemes, turbines are placed in the natural flow of a river. Once in operation, hydro schemes emit very little CO2, although some methane emissions do arise due to decomposition of flooded vegetation. Storage schemes have a higher footprint, (~10-30gCO2eq/kWh), than run-of-river schemes as they require large amounts of raw materials (steel and concrete) to construct the dam.9

- Electricity generated from wind energy has one of the lowest carbon footprints. As with other low carbon technologies, nearly all the emissions occur during the manufacturing and construction phases, arising from the production of steel for the tower, concrete for the foundations and epoxy/fibreglass for the rotor blades.10 These account for 98% of the total life cycle CO2 emissions. Emissions generated during operation of wind turbines arise from routine maintenance inspection trips. This includes use of lubricants and transport. Onshore wind turbines are accessed by vehicle, while offshore turbines are maintained using boats and helicopters. The manufacturing process for both onshore and offshore wind plant is very similar, so life cycle assessment shows that there is little difference between the carbon footprint of onshore (4.64gCO2eq/kWh) versus offshore (5.25gCO2eq/kWh) wind generation (Fig 2).11 The footprint of an offshore turbine is marginally greater because it requires larger foundations.

The use of biomass is generally classed as 'carbon neutral' because the CO2 released by burning is equivalent to the CO2 absorbed by the plants during their growth. However, other life cycle energy inputs affect this 'carbon neutral' balance, for example emissions arise from fertilizer production, harvesting, drying and transportation. Biomass fuels are much lower in energy and density than fossil fuels. This means that large quantities of biomass must be grown and harvested to produce enough feedstock for combustion in a power station. Transporting large amounts of feedstock increases life cycle CO2 emissions, so biomass electricity generation is most suited to small scale local generation facilities, or operating as combined heat and power (CHP) plants.7 The range of carbon footprints for biomass is related to the type of organic matter and the way it is burned (Fig 2). Combustion of low density miscanthus results in higher life cycle emissions (93gCO2eq/kWh), than gasification of higher density wood-chip (25gCO2eq/kWh).

Current gas powered electricity generation has a carbon footprint around half that of coal (~500gCO2eq/kWh), because gas has a lower carbon content than coal.

Coal burning power systems have the largest carbon footprint of all the electricity generation systems analysed here.

For more information on carbon footprints of energy generation read the UK Parliamentary Office of Science and Technology Energy and Environment Report Number 268, Carbon Footprint of Electricity Generation, October 2006.

Appendix 2

Comparison of Scored Environmental Impacts by Fuel/Technology

Comparison of Scored Environmental Impacts by Fuel/Technology APPENDIX 2

	Contaminant Emissions	CO2	Radioactivity	Land Use	Water Impacts	Waste Impacts	Resource Availability	Total Impact (Weighted)
Hydro (run of river)	0	1	0	0	0	0	1	21
Hydro (impoundment)	0	1	0	4	5.5	0	1	30.5
	0	1	0	8.5	5.5	0	2	36
Wind	1	1	0	4.5	0	0	0	34.5
Biomass	2	1	0	1	4	1	1	47
Photovoltaic	2	1	0	1	0	0	0	41
Nuclear	1	1	6	1	4.5	1	5.3	47.8
Natural gas (single cycle)	2	3	0	1	2	0	8	91
Natural gas (combined cycle)	2	2	0	1	2	0	8	71
Natural gas (cogeneration)	2	2	0	1	2	0	8	71
Gasification (without CO2 removal)	4	6	10	1	2	0	2	175
Gasification (with 90% CO2 removal)	4	2	10	1	2	0	2	95
Coal	5	7	10	1	3.5	10	2	216.5
Oil	5	10	1	1	5	3	5	265

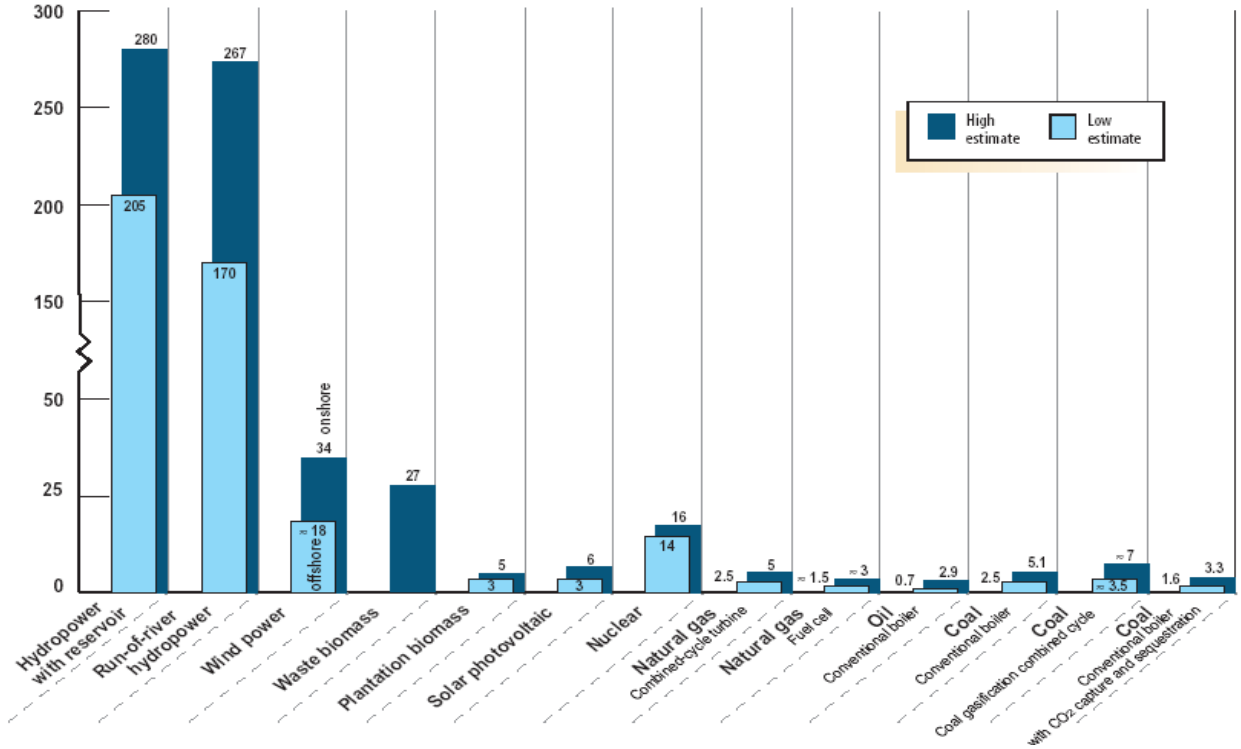
Note: The Total Weighted Impact is calculated by applying a weight of 10 to contaminant emissions, 20 to greenhouse gases, and 1 to all other categories.

Source: SENES Consulting and Ontario Power Authority, 2006

Appendix 3

Power plant Lifecycle Energy Payback Ratio

Power plant Lifecycle Energy Payback Ratio = Energy Produced divided by Energy required to build, maintain & fuel it.
According to Hydro Quebec's Electricity Generation Options report in July, 2005 hydropower project have the lowest Power Plant Lifecycle Energy Payback Ratio of 13 types of power generation. The graph below shows the PPLEP Ratios.



Source: Hydro Quebec's Electricity Generation Options report in July, 2005